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### Original Articles.

#### INTERPRETATION OF THE WASSERMANN REACTION.\*

By WILLIAM P. BOARDMAN, M.D., Boston.

In the interpretation of the Wassermann reaction we must remember that it was only about twelve years ago that this test was introduced into this country and we do not yet know what the nature of the reaction is: whether chemical, physical, biological or a combination of these; and on this account, if for no other reason, we should not try to make it displace all previous knowledge about the diagnosis, prognosis and treatment of syphilis.

Thibierge<sup>1</sup> says, "It is not a definite chemical reaction like the tests for arsenic or sugar, but consists in the testing of properties of substances of unknown composition, existing in unknown and surely very variable quantities, by means of other substances of equally unknown nature, existing in the reaction in also unknown doses, mingled with a lot of substances still less known, in proportions independent of those which take part in the reaction." The only deduction to be made from

this definition is that there is as yet very little known about the nature of the reaction.

Craig<sup>2</sup> has shown that the reaction varies considerably from day to day when the blood of the same patient is drawn daily and tested by the same set of reagents and by the same serologist.

In looking for a cause for these variations, attention has been called to the fact that there is great variation in all the reagents which are combined in the test.

The complement (guinea-pig serum) varies greatly, not only in its hemolytic properties, which are generally tested preliminary to the test, but also in its deviability in the presence of antigen and the various sera that are being tested. This deviability is something we cannot test out beforehand, though we do try to eliminate the error by using a mixture of the sera of several guinea pigs, thereby hoping to obtain a fair average.

The antigens used in various laboratories and even in the same laboratory vary enormously in their sensitiveness. Probably the most delicate one is that which we use at the Boston City Hospital and quite generally employed about Boston, namely, an alcoholic extract of beef heart or human heart reinforced with cholesterin. The more delicate the antigen, the more surely are we going to obtain

\* Read at the Clinical Meeting, Boston City Hospital, Jan. 8, 1920.

false positives and this is the great objection to this antigen. On the other hand, with a less delicate one, we are surely going to miss a lot of active syphilis, especially in the treated cases. Moreover, if the results are carefully checked up with the clinical side of the cases and the dose of the antigen varied according to the results, I think that the false positives are very rare in cases where the diagnosis of syphilis is in question. But as the antigens are made from different hearts, and sometimes even when they are made from the same heart, their composition and properties vary somewhat and the results of the reaction are accordingly more or less modified. By varying the dose, too, as I have already indicated, we can produce great variations in the results with the same antigen.

In the patient's serum we have a factor that varies greatly under different conditions when fresh and still more when contaminated and kept in a warm room for several hours. Kolmer<sup>6</sup> has shown that a very small amount of alkali and a still more minute amount of acid, either of which might come from improper cleansing of the glassware used to contain the serum or in the test, may cause a positive result or make the blood anticomplementary. A slightly larger amount of either alkali or acid may cause hemolysis of the red corpuscles and give a false negative result.

The sheep's corpuscles used in the test vary greatly in their fragility, but this is always taken into account in the preliminary titration. On the other hand, if care is not taken to have the suspension of uniform strength each time, some variation is sure to come from reading the results especially in the weaker reactions.

In regard to false positive reactions, they have been found in about every conceivable disease, but we must remember that syphilis is a protean disease and that it often gives no signs or symptoms for years at a time, so that we are likely to find positive reactions in all sorts of conditions due to a latent syphilis which, though present, has nothing to do with the present condition of the patient. Among the conditions where false positives have been repeatedly reported, I shall mention only those which are common hereabouts. Infected blood, especially with *staphylococcus aureus* or *albus*, may give a false positive as Craig<sup>4</sup> has shown,

though the more common finding in these contaminated specimens is an anticomplementary result. Ether narcosis has long been known to give a positive reaction for a few days, mostly, however, only a weakly positive. Icterus has frequently given positive results with some investigators, though I have never seen it except in syphilis, even though I did a fairly large series of icterus cases at one time. Malaria has frequently given positive reactions, but the fact here seems to be that it is only positive for a day or so around the time when the patient is having the chills. Whether measles or scarlatina give a positive reaction is a much mooted point, but the latest information is an article by Laederich<sup>2</sup>, who finds positive reactions in both diseases on the fourth or fifth day (without relation to the severity of the symptoms in the particular cases), which appear always by the fifteenth day. With the cholesterin antigens these reactions were strongly positive, while with plain alcoholic extract only weak ones were found. In tuberculosis cases, Craig,<sup>5</sup> in a large series, finds no false positives, whereas Müller,<sup>7</sup> though he finds none in the earlier cases, finds about five per cent. in those with late complications, such as laryngeal involvement. It is interesting to note in Craig's figures, however, that there are more positives in the tubercular patients than in the colored regiments of the army, a fact explained by him as due to the very frequent concomitance of syphilis and tuberculosis. In malignant diseases we do not get false positives except late in the disease, when it does occasionally occur. I have seen it three times in cases where I feel sure there was no syphilis present to account for it and all were very near to the fatal termination of the disease. Septicemia has been found to give positive reactions in rare cases. The same is true of leukemia, especially of the splenic type. Weil<sup>8</sup> has lately found positive reactions in seven out of nine cases of splenomegaly, in which the patients were made worse rather than improved under antisyphilitic treatment. False positives have occasionally been reported in pneumonia, especially around the time of the crisis.

So much has been said of false positive reactions that we are liable to forget the fact that there is such a thing as a false negative. These are uncommon, but I have seen them occur in rare cases where the blood is old. It is

also very commonly due to the ingestion of only moderate amounts of alcohol during a day or two previous to the taking of the blood. False negatives are not infrequently seen in pregnant women about term or during the puerperium, being positive before and after this time and active syphilis being present at the time.

In syphilis itself, as is well known, the percentage of positives varies greatly with the stage of the disease, being rarely positive before the sixth week after infection or the third week after the appearance of the chancre. The percentage of positives increases from that time until the secondary stage is reached, when it is nearly always positive. However, it is well to bear in mind that some cases do not show a positive until the rash has been present for some time, and in rare cases not at all, so that even here we cannot depend on the Wassermann test absolutely to make the diagnosis for us. I have seen two or three such cases, one of which I followed for some time and he never showed a positive reaction even though he had very definite and active secondaries and later a tertiary throat which reacted only to very intensive treatment. In this connection I might mention that several authors have found weak or negative results in malignant syphilis. In tertiary syphilis the percentage of positive reactions varies around eighty per cent. Here again we must depend on the clinical signs in about twenty per cent. of the cases. In latent cases the percentage varies greatly according to whether the case has had treatment recently or not and according to how old the process is. In congenital cases a positive reaction is often delayed until the outbreak of symptoms, when it is almost invariably positive. In adult congenital cases, however, with active syphilitic lesions, the reaction is positive only in about 75 or 85 per cent., according to Craig. Here again we have to depend on the clinical signs and the more or less well known stigmata of congenital syphilis in a fairly large proportion of cases. In internal syphilis of the heart, aorta, liver, and testicles, the reaction is said to be nearly 100 per cent. positive in the active cases, but I fear that the reason for this high percentage is more correctly due to the fact that the clinician depends on the Wassermann for his diagnosis and calls only those syphilitic which show a positive test.

However, in regard to the liver and testicles, I have not seen a case which was proven by antisyphilitic treatment or by autopsy to be syphilis which did not give a positive reaction and always a strong one. In nervous syphilis the reaction on the blood is positive only in about 65 or 70 per cent. of the tabes, more often in meningeal or arterial forms and nearly 100 per cent. in general paresis, though in all these we can obtain more information by examining the spinal fluid in addition.

Now as regards the interpretation of the reaction as a guide to treatment. Most all authorities claim that a negative reaction in the course of treatment in a primary case, where treatment is instituted before the reaction became positive and where it has persistently been negative throughout, is a good sign taken in connection with the absence of clinical symptoms other than the original chancre and is a legitimate argument for shortening the course of treatment somewhat in such a case.

In secondary cases under treatment, we all like to see the reaction become negative as soon as possible, the same as we like to see the clinical manifestations disappear and in the same way we feel that when both respond quickly to treatment, the latter is intensive enough for the time being and if necessary for the general condition of the patient, we can go a little easier on the treatment for the time. If it does not return to positive during the next two or three years, the patient in the meantime shows no recurrent symptoms, possibly we can shorten the treatment of the case a little, especially if the spinal fluid and possibly the luetin reaction show nothing to suggest further activity of the disease. But further than this a negative reaction in the course of a case of secondary syphilis under treatment means practically nothing.

In tertiary cases the reaction varies much less than in the secondary and is usually much harder to turn to a negative, though when it does turn, it generally stays there if the treatment is not interrupted too soon, so that most authors feel that in these cases the Wassermann test is a better guide to treatment than in the secondary, though here again the test has been in existence too short a time to allow us to change our treatment too much on account of it. Then again, in spinal syphilis,

the reaction is frequently changed to negative long before the spinal fluid has changed or the symptoms have been cleared up, so that here it is not of much use as a guide to further treatment. In still other cases of tertiary syphilis, especially those of long standing, it is practically impossible to change the reaction to negative. This seems to be especially true in general paresis and in arterial syphilis. Here it would be a great mistake to continue with salvarsan and mercury and cause an incurable irritation of the kidneys or some other permanent damage when we do not know that this positive reaction means active syphilis. Wile<sup>9</sup> has made the suggestion that in some of these cases, the positive reaction corresponds to a positive tuberculin test in old, arrested tuberculosis.

In regard to treatment of cases that show nothing but a positive Wassermann reaction, with no history of syphilis, I feel very strongly that if this reaction is present and strongly positive on several different occasions, and the patient shows no other condition which might cause a positive reaction, the patient should be treated for syphilis and intensively treated. It has been definitely shown that between 30 and 50 per cent. of the cases of late clinical syphilis give no sign or history of previous infection and the medical examiners tell us that syphilis is one of the very frequent causes of sudden death, often where syphilis was never suspected by the patient during life. Now, as these cases have received no previous treatment, it is only logical to suppose that the Wassermann reaction would have been positive in a large proportion of them for some time previous to the appearance of symptoms and by timely treatment during this apparently latent stage and in no other way can this sort of accident be avoided.

A few words might be said in regard to the reading and reporting of the Wassermann reaction. In the army, a one plus is a weak reaction and a two plus is a strongly positive one. In other places we find the one, two, three and four plus signs used. In the Boston City Hospital we use three plus signs for the strongest reaction. All these signs mean merely the degree of hemolysis and the more grades used, the more accurately can the results be compared. I feel that in a treated case the very weakest reaction is an indication for more

treatment, whereas for diagnosis, outside of nervous syphilis, a one plus, as we use it, means nothing for the diagnosis of syphilis. A two plus should only be considered as a sign of syphilis when found in connection with pretty strong clinical signs. On the contrary, I feel that a strongly positive reaction (three plus as used at the Boston City Hospital) means syphilis, whether clinical signs are present or not, if it is repeatedly present and there is nothing else in the case which might give a positive, such as advanced tuberculosis or malignant disease in a late stage.

In conclusion, let me remind you that the Wassermann reaction is still in its infancy and its nature is entirely unknown, but it is to be used as an important clinical sign of syphilis and I think that you will find no more variations in it than you will in the findings of several men in the examination of a chest by auscultation and percussion.

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## THE DIAGNOSIS OF PRIMARY SYPHILIS.

BY HENRY D. LLOYD, M.D., BOSTON.

AFTER infection by the treponema pallidum, the incubation period before the chancre appears varies between three and six weeks, with an average of three and one-half to four. Some men place the outside limits of time as between ten and seventy days. Experimentally the average in apes is twenty-five days. In trying to learn the length of this incubation period it is worth while to remember that while the last sexual exposure may have been only one week before the patient is seen, there may have been an earlier one antedating the nearer exposure by just enough time to make the proper interval.

In regard to the clinical examination of the suspected lesion or lesions, Taylor<sup>1</sup> states there are six varieties of chancre seen clinically: the chancreous erosion, the silvery spot, the dry papule, the umbilicated papule, the purple necrotic nodule and the ethymatous chancre. As a matter of fact, the primary lesion of syphilis



begins as a papule and all the above-noted forms are simply modifications of the papule. The erosion and ulceration which are noted in chancres are due to trauma or infection other than treponemae, or both. The primary papule is quickly eroded; it is usually either round or oval in shape; it is not truly granular but smooth like muscle and closely resembles muscle in color. It may or may not be much indurated; the eroded surface is frequently above, not below, the surface of the normal surrounding tissue, and it has a tendency usually marked to weep serum. It is not tender as a rule. It may be single or multiple although the former is more common. The more usual locations for the penile primary lesion are at or near the frenum or in the balano-preputial furrow. In the latter situation the induration is apt to be most marked and as the prepuce is rolled back the induration can be plainly seen. Also in this situation phimosis is common. In a series of 75 primary lesions in this location observed by Klauder,<sup>3</sup> phimosis was present in 61.3%. In his whole series of 121 chancres, phimosis was present in 13.2%. The same observer states it to be his conviction that a very large majority of all penile lesions occurring on the shaft are luetic.

The surface of the primary lesion may be clean or covered with a gray ethymatous or cream green membrane. The amount of induration present is variable. Those lesions situated either on the inner or outer surface of the foreskin are the more apt to be indurated, while those occurring on the glans or shaft are less likely to be.

In the female the genital primary lesion has the following distribution according to Fournier<sup>3</sup> in a series of 249 cases.

Greater lips .....	114
Lesser lips .....	55
Fourchette .....	38
Cervix .....	13
Introitus vaginae .....	9
Urinary meatus .....	17
Superior vulvar commissure .....	2
Vagina .....	1

The primary lesion as observed on the female genitalia except those on the greater lips is less apt to show marked induration, and is rather more apt to present a surface covered with a dirty exudate than the chancre in the male.

The glands resulting from syphilitic infection are usually very characteristic. They may

be small or large, are discreet, not attached to the skin, and not tender. They begin to enlarge usually within a week or ten days, although the period may be as long as three weeks. Frequently the dorsal lymphatic of the penis becomes enlarged, hard and occasionally a hard nodule may develop along its course near the root of the penis.

Clinically it is important to remember that either an ordinary pyogenic infection or one by the *Bacillus of Dugrey* may disguise the result of treponemal infection; also that the primary may vary in size from a scratch or minute erosion to the size of a walnut. We have observed examples of each.

We now come to a consideration of the newer methods of diagnosis, the examination of the secretion from a suspected lesion by means of the darkfield microscope, and the Wassermann reaction. The difficulty of recovery of the treponema pallidum from any luetic lesion is vastly increased by the use of the applications commonly in use. The commonest of these are silver nitrate and some form of mercury. Therefore no suspected penile lesion (and all lesions should be suspected) should have any application other than normal saline or boric acid in some form until the diagnosis has been made for or against lues. If any application has been made other than some neutral substance it will probably be necessary to wait 24 to 48 hours before it will be possible to recover the pallidum, assuming it is present. Klauder<sup>3</sup> in the series previously quoted obtained a positive darkfield examination in 57.1%.

Some little time ago C. Morton Smith<sup>4</sup> analyzed a series of primary syphilis seen in the South Medical Clinic of the Massachusetts General Hospital, and found that in roughly 96% the darkfield had been positive. The latter figure is, I believe, more nearly what should result from the use of the darkfield microscope. The younger the chancre and the less treatment it has endured, the better the chance of recovering the pallidum, assuming the skill of the examiner is uniform.

What actually are the necessary details of a proper darkfield examination? First, let me say again that one of the most important, if not the most important factor, is an untreated or neutrally treated lesion. The suspected lesion is gently but thoroughly cleansed with ethyl alcohol. The reason for the use of the

alcohol lies in its dilatation of the superficial vessels, thus producing a greater flow of serum. The cleaning of the lesion should be thorough enough to remove any contaminating pus cells, but gentle enough so that the microscopic picture will not be obscured by red blood cells. The cleansing accomplished, sufficient gentle pressure is put upon the suspected lesion to produce a flow of serum. If the treponema pallidum is present in this serum, what do we see, looking into the darkfield microscope? Noguchi's description is classic: "Treponema has a slender cylindrical, spirally wound, highly flexible body, which exhibits serpentine, corkscrew-like and sometimes lashing movements. The spiral curves are partly stretched and drawn together with a certain rhythm, so that an actively motile organism resembles a spiral spring which is alternately drawn out and relaxed." The same authority gives the measurements as follows: length, 6-14 microns; width, 2-25 microns.

As a matter of practical medicine, I believe that in examining genital lesions there is very little chance of confusing the treponema pallidum with the other non-pathogenic spirochete normally resident in the genitalia, such as the spirochete refringens and the spirochete balantidis. The measurements of these two organisms are respectively  $8-12\mu \times .33\mu$  and  $8\mu-12\mu \times .5\mu-.75\mu$ , these being shorter and thicker than the pallidum. The treponema pertenuis cannot be distinguished morphologically from the pallidum. Occurring as this does in yaws only, a differential diagnosis should be possible on clinical grounds. In the examination of mouth or throat lesions we need to exercise more care as the treponema microdentium closely resembles the pallidum. Its measurements are  $3\mu-12\mu \times .2\mu-.25\mu$  (Noguchi<sup>2</sup>). It will, however, be seen that the treponema microdentium is somewhat shorter than the pallidum and it presents fewer curves. The other organisms likely to be encountered in the mouth and throat, such as the spirochete buccalis, spirochete Vincenti and spirochete refringens are all notably longer and thicker than the treponema pallidum. The curves of these three organisms are coarser and they are much more actively motile.

One more practical point. Even though there be a phimosis present, it is usually possible by careful manipulation to secure material

for examination by the darkfield, and in a surprisingly large number of these cases the results will be positive. In regard to the Wassermann reaction, I shall consider it only from the clinical side. That is to say, at what time of the primary period does the Wassermann become positive?

Klauder<sup>2</sup> found the following results:

DURATION OF CHANCE IN DAYS	NUMBER OF CASES	POSITIVE	NEGATIVE	PER CENT. POSITIVE RESULTS
1-10	33	12	21	36%
10-20	17	11	6	64.7%
20-30	20	14	6	70%
30-40	5	5	0	100%
40+	40	40	0	100%

Craig<sup>4</sup> in a series of 600 cases of primary syphilis obtained the following results:

WEEK AFTER APPEARANCE OF CHANCER	TOTAL CASES	POSITIVE	PER CENT. POSITIVE	NEGATIVE	PER CENT. NEGATIVE
1st week	77	27	36.3	50	64.9
2nd week	155	92	59.3	63	40.8
3rd week	158	109	68.9	49	31.0
4th week	167	129	77.2	38	22.7
5th week	43	35	81.3	8	18.6

Craig also speaks of two cases in which the Wassermann test was positive five days after the appearance of the initial lesion. Most observers agree that in the secondary period the Wassermann test properly performed is nearly 100% positive.

The extra-genital chancre deserves a few words. Bulkley<sup>7</sup> in 1894 published a series of 9058 cases collected from the literature. Of these 20% were situated on the lips, 12.5% on the breasts, 5% on the hands. In Bulkley's private practice he noted a series of 113 cases. Fifty of these were on the lips, 15 were on the tonsils and 15 on the fingers, 7 were on the breasts, 6 were on the tongue and the remaining 20 were variously distributed.

H. N. Cole,<sup>8</sup> of Cleveland, in reporting a series of 61 extragenital chancres, states that 43 cases occurred on the lips, 3 on the tonsil, 1 on the tongue, 10 on the hands, 1 on the neck behind the ear, 1 on the left jaw, 1 on the abdomen, and 1 on the breast, a double infection of the nipples. Cole says, "Given any single sore on the body which tends to persist, to increase in size and induration, and to involve nearby lymph glands, one should always keep the chancre in mind."

The differential diagnosis of the extragenital lesion may involve many conditions, but the ones chiefly to be kept in mind are late luetic lesions and carcinoma.

CHANCERE	CHANCROID	HERPES PROGENITALIS	SCABIES	CARCINOMA	LATE LUTIC LESION
Incubation 3 to 6 weeks	2 to 5 days	Short	Probably several weeks	No known incubation but slow developing	No incubation period
May be single or multiple, more commonly single	More commonly multiple	Usually multiple	Usually multiple	Single process	Single usually
Subjective symptoms slight or absent	Considerable pain and tenderness	Usually itching and burning	Itching	Pain	Essentially destructive in its nature
Lesion not excavated and surrounded by normal tissue. Surface of lesion smooth raw muscle color. Often indurated	Lesion excavated, edges of ulcer undermined, surface of lesion dirty	Begins as vesicle on inflamed base	Vesicular, papular or pustular. Burrows may be seen. Lesions found in other localities	Ulcerated slightly elevated pearly border. May be crusted	Surface is granular and more apt to be infected.
Glands are hard, discrete not tender, not attached to skin	Glands hard and tender, matted together, frequently break down	No glands	No glands	Glands develop very slowly.	Glands not involved
Only auto-inoculable in first 10 to 12 days	Always auto-inoculable	Not auto-inoculable	Is spread by auto-inoculation	Not auto-inoculable	Not auto-inoculable
Treponema pallidum	Bacillus of Ducey present	Usually no organisms	Acarus scabiei present	No organisms	Wassermann positive in 70% to 80%
Occurs at any age	Occurs at any age	Usually during the years 20 to 40	Usually during the years 20 to 40	Occurs late in life	Possible previous history of syphilis

The differential diagnosis in a genital lesion lies between the following conditions: chancre, chancreoid, herpes progenitalis, scabies, carcinoma and late luetic lesions. The following table shows the difference:

#### CONCLUSIONS.

One of the most important factors, if not the most important, in the successful diagnosis of primary syphilis is a lesion which has not been treated either with silver nitrate or some form of mercury.

In a series of 97 consecutive cases a positive diagnosis was made in 96% by means of the darkfield microscope. In a number of these cases, however, repeated examinations were necessary.

The positivity of the Wassermann test, which at the end of ten days averages about 30-35%, increases to practically 100% at the end of the fifth week after the appearance of the chancre.

By employing careful clinical observation and both laboratory methods of examination, repeatedly if necessary, but few cases of primary syphilis should go unrecognized.

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### LEAD IN THE URINE IN NEURO-CIRCULATORY DISTURBANCES.\*

By C. A. McDONALD, M.D., AND HENRY McCUSKER, M.D., PROVIDENCE, R. I.

Of late, lead poisoning has been a favorite subject with industrial hygiene investigators and already much work has been done on acute and subacute plumbism in lead workers. Recently some work has been started on chronic lead poisoning, and very recently, experiments have been begun to determine the intake and output of ingested lead. In the cases of acute and subacute lead poisoning reported, and in those found in hospital records, there has been shown a trace of lead in the urine.

\* Read at the Neurological Staff meeting, Massachusetts General Hospital, March, 1920.

Some observers also test for lead in the stools, but stool lead shows ingestion and does not show absorption. The urine examination for lead is more satisfactory because it shows the amount of absorption.

Dr. Chapman of Providence was one of the first to show the amount of lead necessary to cause symptoms and signs. He asserted that from one quarter to one half a milligramme (.00025 to .0005) of lead per liter of urine (estimated by standard methods) is sufficient to cause chronic plumbism, and quoted a number of cases which, he alleged, were due to this amount of lead or more. Accepting his standard as the minimum amount of lead to cause symptoms and signs, we are reporting the following cases:

CASE 1. No. 6481, Butler Hospital Record, male; aged 24; born and raised in Woonsocket, R. I. He served with the A. E. F. in France. While in the service he became paralyzed on the right side and became aphasic. He was admitted to Butler Hospital on August 29, 1919. Before the war he lived in Woonsocket and used the city water. He had had several occupations in a mill and had worked about three months in a paint shop as a paint scraper. When examined he was found to have a right hemiplegia with aphasia. In this case there was no evidence serologically of neurosyphilis. Signs and symptoms of brain tumor, cardiac disease, renal disease with hypertension (blood pressure 126-96), arteriosclerosis, or of endocrine disease, were absent. There was nothing in the history of the findings which suggested an infectious cause or a blood condition which might cause a cerebral hemorrhage. The work in the paint shop suggested lead. After a short course of KI the urine examination showed 0.0016 of lead per liter of urine. Examination of home tap water showed 0.0035 lead per liter.

CASE 2. No. 2985; male; aged 49; carriage painter by trade. One year ago, after a tooth extraction, he showed a right hemiplegia without aphasia. After this he suffered a depression or so-called "nervous breakdown." Examination showed his teeth in poor condition. Blood and spinal fluid Wassermann were negative. Blood pressure was 130-90. Fundi were negative. Urine examination showed no albumen and no sugar. Gravity adjustable. It also showed 0.004 lead per liter of urine.

CASE 3. No. 2992; male; aged 50; carriage painter. Six years ago he was taken sick on the street with vertigo and sub-sternal distress. Since that time he has had many like spells. At the present time he has a phobia for crowded places, street cars, etc. On examination the fundi were negative. Cranial nerves

were negative. Teeth were in poor condition. Heart was enlarged. Arch dullness was increased. Blood pressure was 190-90. In the right third interspace there was a diastolic murmur. Brachials were visible, tortuous, and sclerosed. Blood Wassermann negative. Urine examination: Albumen showed as a slightest possible trace. Specific gravity 1010, not fixed. No casts and no sugar. Lead, after KI treatment, showed 0.001 per liter of urine.

CASE 4. No. 2762; male; aged 50; no occupation for two years. Complaint—Multiple pains and aches of face and body. Neurological and systemic examinations were negative. Blood Wassermann negative. Teeth showed much pyorrhea. No evidence of focal infection. Urine negative for sugar and albumen. It showed 0.0019 of lead per liter. Much relief came after the removal of the teeth and the substituting of spring water for tap water and the administration of KI by mouth.

CASE 5. No. 2543; male; aged 40; storekeeper. Complaint—Epileptic spells at 36. Examination showed him to have a normal personality. Urine was negative for sugar and albumen. Red renal test normal. Blood Wassermann and spinal fluid negative. Spinal fluid showed 18 cells and an increase of globulin. There is no evidence of arteriosclerosis. X-rays of sella turcica showed an elongation of the anterior and posterior clinoid processes and a definite shadow within the sella, thought to be a condensation of the pituitary gland. Urine showed 0.0082 lead per liter. Spring water was substituted for tap water for drinking and cooking, and KI was given by mouth. Much improvement has been noted in general condition and in the number of seizures.

CASE 6. No. 2765; male; aged 40; lawyer. Complaint—A migraine of a migraine family. Within the past year he has had two fainting spells. Excellent personality. General examination, neurological and systemic, showed no abnormalities excepting an eye difficulty for which he wore glasses. Examination of urine showed 0.0018 lead per liter. House tap water showed 0.566 p.p.m. His glasses were refitted, tap water was no longer ingested and KI was administered. There have been no headaches and no fainting spells in four months, which is unusual.

CASE 7. No. 2532; male; aged 44; master plumber. Complaint—Malaise, headache, indigestion, and vascular hypertension. Blood pressure 200-100. Blood Wassermann negative. Urine negative for sugar and albumen. Red renal test, 65%. Urine showed 0.0019 of lead per liter. While under observation he had an intestinal hemorrhage, probably from duodenal ulcer.

CASE 8. No. 2564; female; aged 42; housewife. Patient was first seen on January 17, 1920. Complaint—She complained of palpitation



and headache and said that she had been told that she had high blood pressure. Examination showed that she had no organic nervous disease. Blood Wassermann was negative. In the urine there was no albumen and no sugar. The specific gravity was variable. The red renal functional kidney test was 60%. Blood pressure was 180-95. There were no signs of anemia. The urine showed 0.014 of lead per liter. The tap water of her house showed 0.45 p.m.p. Spring water was ordered and tap water denied either for cooking or drinking. Small doses of KI were administered. Three months later palpitation had gone; the blood pressure was 150-90. The lead in the urine was reduced by two-thirds. This woman was impressionable but claimed to be benefited.

CASE 9. No. 701; male; aged 60; inventor. Complaints—Loss of color, constipation, general weakness, and left hemiplegia. He showed signs of hemiplegia of mild degree without speech disturbance. His general weakness upset him more than his hemiplegia. Urine analysis showed no albumen and no sugar. Specific gravity 1015. Red renal test was 50%. Blood Wassermann was negative. Blood smear was negative for malaria and signs of anemia. There was no blood in his stools and no ova. He was a man who had had many business cares, had not used alcohol and had used but little tobacco. In a liter of his urine there was found 0.0032 of lead. The tap water in his home showed 0.43 p.m.p. and that of his place of business 0.63 p.m.p.

CASE 10. No. 2759; male; aged 54; machinist. Complaint—For one year he has suffered from pain and coldness of his feet. In the winter he has suffered sufficiently to interfere with his vocation. He stands and sits at his work. He lives in the city in a very old house and while at work drinks water from an artesian well. There was no syphilis in his history. He admitted the abuse of alcohol up to a few years ago. He had used much tobacco over a period of many years. There were no signs of organic nervous disease and no signs of cardio-renal disease (blood pressure 140-90). The retinal vessels were sclerosed, the radials were moderately sclerosed, the arch did not percuss enlarged. There was pulsation in his posterior tibials but no pulsation in his right or left dorsalis pedis. His teeth had been extracted. His prostate was not enlarged. On both feet, his first and second toes were pale and cold. The home tap water showed 0.5 of lead p.m.p. Examination of his urine showed 0.012 of lead per liter. By stopping the ingestion of his house water, and by the use of KI, electricity, and massage, he showed improvement.

CASE 11. No. 2641; female; aged 47; housewife. Complaints—Acroparaesthesiae of her hands and a great feeling of fatigue; cramp-

like feeling of the muscles; constipation. Examination showed a woman with active deeper reflexes with no evidences of cardiovascular-renal disease. She had some thickening around her small joints—a mild arthritis, perhaps. Blood Wassermann was ++. A spinal fluid examination was refused. A second blood Wassermann was negative. Her teeth were in poor condition. She was looked upon as a case of arthritis and ataxic paraplegia without any evidence as to the cause. The urine showed 0.0026 of lead per liter. The routine treatment previously described was instituted but she was lost sight of.

CASE 12. No. 2480½; male; aged 40; printer. Complaint—Paralysis of his arms and wrists, slow in onset. Examination showed patient to have a progressive muscular atrophy involving most of the muscles supplied by the brachial plexus on both sides. The knee jerks were active. There were no Babinski and no ankle clonus. There was some loss of muscular substance of the right gluteal group. There was a slight bladder disturbance. Of the cranial nerves there were no pathological signs excepting a right Horner's syndrome. Competent neurologists looked upon this case as one of progressive muscular atrophy coming on in a printer. Much later a urinary analysis showed 0.026 of lead per liter. Routine examination, however, showed a positive blood Wassermann, and the spinal fluid findings were those of neurosyphilis.

#### SUMMARY.

These twelve cases represent nervous disorders of many types. Not one of them showed signs of lead poisoning, like the lead-line, anaemia, or stippling. It was only by making a routine urinary examination for lead in doubtful cases that the lead element was discovered. These cases are reported, therefore, to stimulate corroboration or refutation of Chapman's standard, that four-tenths of a milligramme of lead per liter of urine is sufficient to cause symptoms; and secondly, to argue for the consideration of lead as the etiological factor, or one of the etiological factors, in obscure cases presenting neurological signs and symptoms.

#### A REVIEW OF THE RECENT WORK ON AMOEBIC DYSENTERY.

BY WILLIAM ALLAN, M.D., CHARLOTTE, N. C.

DURING the period of the war considerable advance has been made in our knowledge of several of the factors of the amoebic infection

problem, particularly by our British allies. In their campaigns in the Eastern Mediterranean area they were promptly confronted with serious casualty rates from dysentery, and as the Gallipoli dysentery was reported as largely amoebic by early observers, they met this situation by intensively training a number of protozoologists and concentrating their chronic dysenteries in special hospitals.

This war work has increased materially the definite statistical data of the incidence of amoebic infections among different races and in different parts of the world. In examining about 31,000 British troops returned from the Near East, the majority of whom had had dysentery or other bowel disorders, 9.8% were found infected with *Entamoeba histolytica*.<sup>1</sup> Of nearly 7,000 troops and civilians without any history of bowel trouble, examined in the Eastern Mediterranean area, or invalidated from that region, 10.5% were found infected. In 5,000 persons with a record of intestinal disorders examined in France and England, mostly troops from the Western Front, 8.9% were found infected, while in 3,761 individuals without bowel troubles, 5.8% were infected. Kofoid found 10.8% of 1,200 American soldiers returning from France infected. The great majority of these individuals received a single examination, which Dobell has shown brings to light less than one-half of histolytica infections, so that the figures given above are something less than half the true incidence of this protozoal infection. Such a brief summary may give some idea of the magnitude of the problem; of the approximately 50,000 persons examined, both in Western Europe and the Near East, both healthy and dysenteric, between 13% and 25% were infected with *Entamoeba histolytica*.

Medical men have been handicapped by a lack of zoological knowledge of the intestinal amoebae, but have had to go blunderingly ahead because of the slowness of trained protozoologists to lead the way out of this wilderness. Schaudinn in 1903 adopted the placing of the intestinal amoebae in a new genus, *Entamoebae*, by Cassigrandi and Barbagallo, and emphasized anew the distinction between pathogenic and non-pathogenic species. During the next ten years many new species were described by many observers, the *Entamoeba tetragena* of Viereck being the most important.

Walker's<sup>2</sup> work in Manila in 1911 finally led to the abandonment of Schaudinn's erroneous description of *Entamoeba histolytica* and to the boiling down of the *Entamoebae* of man into two species, *Entamoeba histolytica*, pathogenic, and *Entamoeba coli*, non-pathogenic. As the former has four nucleated cysts and the latter eight nucleated cysts, all seemed plain sailing for the easy differentiating of species. But in 1917 Wenyon and O'Connor<sup>3</sup> described a non-pathogenic *Entamoeba* of man, with four nucleated cysts, calling it *Entamoeba nana*. Their work has been accepted, confirmed and extended by other British workers, and by our own protozoologist, Kofoid, who has shown<sup>4</sup> that this new species is fairly common. Dobell<sup>5</sup> in his recent excellent monograph on the zoological status of the amoebae living in man has created a new genus for this amoeba, *Endolimax*, calling the organism *Endolimax nana*. So that we now have to deal with and differentiate three species of parasitic amoeba, namely, *Entamoeba histolytica*, pathogenic, with four nucleated cysts, *Entamoeba coli*, non-pathogenic, with eight-nucleated cysts, and *Endolimax nana*, non-pathogenic with four nucleated cysts.

The earlier work on differentiating the intestinal amoebae consisted largely in staining active forms and then interpreting the amount and arrangement of the nuclear chromatin. Needless to say this could never become a popular method. Due to the work of Walker in 1911<sup>2</sup> and of Mathis in 1913<sup>6</sup> and of many others, we have been led to turn from the study of trophozoites to the study of cysts. This has been rendered very much easier by the introduction of iodine, or such iodine stains as Donaldson's,<sup>7</sup> with which the specimen of stool is rubbed up in order to differentiate the cysts. Iodine makes cysts much more readily recognizable and brings out the nuclei sharply.

Dysenteries unsuccessfully treated become convalescent carriers, discharging cysts in their stools intermittently for an indefinite length of time. Besides these, there are many so-called healthy carriers, who present neither past history nor clinical evidence of dysentery. When possible, these cyst carriers should be given the same course of treatment that acute or chronic cases of dysentery receive, for besides being a source of infection to others, some will eventually develop dysentery, and some liver abscess.

Since Rogers' introduction of the use of emetine in 1912, one advance in the treatment of this infection has been made, namely, the introduction of emetine bismuthous iodide. This preparation was first suggested by Dumez,<sup>8</sup> in Manila in 1915. A year later the British began using it and seem to have demonstrated its value. Emetine bismuthous iodide, containing about 29% emetine, is given by mouth in salol or keratin coated tablets, one grain two or three times a day. It may be used alone or combined with emetine injections; at present there is a tendency to use emetine injections for 10 to 12 days followed by two or three grains of the double iodide for 12 days in acute cases, and to give 12 to 14-day courses of the iodide alone in treating carriers. Lillie and Shephard<sup>9</sup> cleared up 62 out of 104 carriers with 12-day courses of three grains of emetine bismuth iodide alone. Jepps and Meakins<sup>10</sup> cleared up 20 out of 24 carriers, and McKinnon cleared up 70 out of 131 carriers. Savage and Young cured 14 out of 17 carriers and eight out of 16 acute cases with the iodide alone, two to three grains for 12 days. Gunn and Savage,<sup>11</sup> using emetine injections for 12 days, followed by emetine bismuthous iodid for 14 days, treated 120 acute cases; 82 were discharged as cured, 46 being kept under observation for more than 30 days, 36 for less than 30 days; 38 of their acute cases relapsed. They treated 190 carriers in the same way; 171 were discharged as cured, 106 after more than 30 days, 65 after less than 30 days; 29 of their carriers relapsed. Turner and Taylor<sup>12</sup> in 366 carriers had 67 to clear up without treatment; 215 were cleared of cysts with emetine bismuthous iodid, and 84 failed to clear up.

These results from British military hospitals seem very encouraging, but their men could be held for observation for only four or five weeks. In spite of Dobell's findings that 90% of relapses in treated carriers take place within three weeks,<sup>13</sup> McAdam has shown that many so-called carriers relapse later on, and Walker long ago found the incubation period of experimental Entamoebic infection running as high as 90 days. In civil life, it would be better to follow cases for a year before pronouncing a cure. In the few acute cases the writer has had the opportunity of treating during the past year, emetine bismuthous iodid has cleared out the cysts, temporarily at least, after

emetine injections had transformed the dysenteric into the carrier state. This new therapeutic agent will doubtless prove very useful, but an estimate of its exact value must await a much more prolonged observation of its effects.

The most important addition to our knowledge of the treatment of amoebic dysentery has been presented by Dale and Dobell,<sup>14</sup> who undertook to work out carefully the strength of emetine solutions which would be lethal to Entamoebae in dysenteric stools. They found that when emetine in solution was applied directly to the Entamoebae, it was not particularly toxic, while it is a well known fact that emetine injections in human amoebic dysentery have a specific amoebicidal effect even in very small doses. They also found that injections of emetine had absolutely no effect on clinical amoebic dysentery in the cat. Therefore, as emetine seems to be without effect both directly and through the medium of the cat, but is very effective through the medium of man, it is pointed out that the specific action in clinical human entamoebic dysentery must be because of its action on the host and not on the parasite.

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## THE AFTER-TREATMENT OF A DISLOCATED ELBOW.

BY ERNEST T. SAEGER, M.D., BOSTON.

THE purpose of this paper is to emphasize the importance of the after-treatment of a posterior dislocation of the elbow—the usual variety of dislocation in the elbow region. Several surgeons have called attention to the fact that myositis ossificans traumatica very often occurs in the muscles near the elbow following an injury in that region. This condition appears very frequently following a fracture in the elbow region, but it is also not rare after a simple dislocation. Lehmann has reported 37 cases of post-traumatic ossification at the elbow joint occurring at his clinic during a period of eight years. The ossification followed posterior dislocation in 19 of these cases.

Various explanations have been made as to the origin of intramuscular masses of bone after trauma. One theory is that osteomata may arise from periosteum. The affected muscle is crushed and the adjacent area of periosteum is injured. Cells of the injured periosteum proliferate, escape into the pulpy area of muscle and there develop. A mass of bone is formed which may have only a loose connection with the periosteum or may become entirely detached from it. Or a muscle in action receives a blow. Some of the fibres tearing loose from their origin and retracting into the mass of muscle still connected with the bone carry with them particles of periosteum. These particles of periosteum grow in the new environment, are true bone grafts, and can form intramuscular, osteomata unconnected with, though originating from the periosteum. Or, as a result of one trauma a regular flap of periosteum is detached from the bone in whole or in part and being drawn into the

belly of a muscle, develops there, forming an osteoma. It is said that a bone cyst may form thus.

The Cohnheim theory of the origin of tumors states that osteomata are primarily muscular, and when connected with bone this connection is entirely secondary. There have been present in muscle aberrant masses of embryonic material originally provided for the development of the normal bone, but unused; they have lain in the muscle until stimulated to growth by trauma.

Ziegler assumes that in subjects of myositis ossificans, whether traumatic or progressive, there is a congenital diathesis of the connective tissue of the muscles, fascia, tendons, and ligaments in that they become endowed with powers normally belonging to periosteum alone.

Various observers differ as to whether the process is a tumor or inflammation. Grawitz and Salmon investigated and pronounced the disease inflammatory. Clinically, they found the temperature often elevated in the early stages and they believed that the acuteness, the amount of swelling, and the tenderness of the affected muscles all indicated inflammation. Microscopically, there was early cloudiness, later degeneration of the muscle fibres and small cell infiltration of the connective tissues around the altered parenchyma. The blood-vessels in the neighborhood were enlarged. From the study of one of his cases, Binnie believes that one is forced to admit the probability of the bone tumor being the result of proliferation and metamorphosis of intramuscular connective tissue.

The elbow joint has a great tendency to produce irregular masses of callus not only connected with its bony points, but also in the surrounding muscle. As the formation of callus beneath stripped periosteum or in the muscle may hinder the development of functional activity, the after-treatment has much to do with functional return. The brachialis anticus and the triceps are the usual muscles involved in a post-traumatic myositis ossificans. Of the 19 cases of posterior dislocation reported by Lehmann, all showed new bone formation in the two muscles mentioned, part of it being of intramuscular formation.

Report of a case of posterior dislocation of the elbow:



Mrs. H— came to the Out-Patient Department of the Peter Bent Brigham Hospital on April 5, 1918. She had fallen out of bed the night before and had injured her right elbow. Examination showed extreme swelling and discoloration in the region of the right elbow joint. The arm was held in nearly complete extension by the patient, as this seemed the most comfortable position. There was intense pain whenever attempt was made to flex the forearm. Extension of the fingers caused severe pain also. No evidence of fracture was found on physical examination, and the injury seemed to be a simple posterior dislocation of the elbow. This diagnosis was confirmed by x-ray examination.

The patient was given an anesthetic and the reduction made. The anesthetic was gas-oxygen with enough ether to obtain complete muscular relaxation. The reduction was easily performed as follows: the forearm was slowly extended and then slightly hyperextended. While an assistant held the patient's arm in this position, the operator grasped the lower end of the upper arm with both hands and pushed on the olecranon process with both thumbs while the assistant slowly flexed the patient's forearm. This method easily disengaged the coronoid process from the olecranon fossa, and caused it to pass on under the trochlea without tearing any more ligaments. The arm was then put up at right angles for a few days until the swelling had disappeared. It was then flexed to an angle of about 60 degrees and immobilized for a period of three weeks following reduction. The arm was now placed in a sling for a week and daily periods of baking, massage, and passive motion were instituted. Three weeks later, or six weeks after the reduction, there was still marked limitation of extension. The forearm could be extended only 10 degrees beyond a right angle. X-ray plates were made and showed no evidence of myositis ossificans, or bony callus around the joint. Hence the limitation of motion seemed due entirely to joint adhesions. The patient was again given a general anesthetic until there was muscular relaxation, and the adhesions were broken up without difficulty. Then followed another period of massage, baking, and gradual passive and active motion. Six weeks after the last anesthesia was administered the patient was discharged. There was no limitation of motion at the elbow joint and no deformity.

It would therefore appear that complete rest

for a period of at least three weeks after reduction of dislocation has the greatest influence in reducing this tendency to ossification. We also know that these masses slowly absorb and disappear if irritation is not continued. Consequently a long immobilization of the arm in a flexed position will often cause their disappearance. Operative removal should be the last step in treatment if conservative methods have failed. The after-treatment which seems safest consists therefore in retention of the forearm in a position of 60 degrees flexion for about three weeks or until passive motion in the direction of extension is painless. Painlessness is an indication of complete healing of the ruptured capsule. After three weeks the arm is massaged and given light passive movements. It is kept in a sling for another week. Each day active movements short of pain production are encouraged, and function gradually returns. Due to the ruptured capsule, the period of immobilization has almost certainly resulted in the formation of firm joint adhesions. Possibly in some cases these adhesions can be broken up by active or passive motion, but it is more likely that another anesthetic will have to be given in order to remove the cause of any limitation of motion. This part of the after-treatment should be performed when there is no longer any progress under treatment by massage and passive motion.

#### CONCLUSIONS.

1. The elbow joint has a greater tendency than other joints to the formation of ossification in the neighboring muscles following trauma.
2. The use of early passive motion and massage following reduction of a dislocated elbow is contra-indicated.
3. There should be absolute rest of the arm for three weeks in order to make the development of myositis ossificans traumatica less likely.
4. The origin of new bone formation may be from osteoblastic cells which have wandered from the torn periosteum and proliferated, or it may be a metaplasia of the connective tissue of the capsule or intermuscular septa.
5. Unfortunately immobilization will almost certainly result in the formation of firm joint adhesions which will have to be broken up under general anesthesia.

### Clinical Department.

#### THE USE OF THE THERMOMETER IN MENTAL DISEASES.

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Not long ago the thermometer was considered of no value in mental diseases. There was a tradition that the insane never got fevers. At present there is recognition of the importance of temperature records among the insane, but not enough. The general practitioner, if he meets the mental symptoms of the case first, seems to forget all about his thermometer and stethoscope. Even on the chronic wards of the hospitals for the insane, I suspect that more fevers would be shown if records were made more as a routine, and also if it did not take so much time and trouble to get records upon disturbed and resistive patients. On an admission ward, however, fevers occur frequently, and here and in the practice of the psychiatrist are to be found the opportunities for the further study of the relation of increased bodily heat to mental diseases.

From January 1, 1916, to the first week in July, seventy-one women were admitted to the Department for Mental and Nervous Diseases of the Pennsylvania Hospital. Fevers slight or severe, transitory or chronic, occurred in over 50 per cent., a surprising result for consecutive cases. Undoubtedly selection has had some part in determining this percentage—physicians perhaps tending to send deliria of certain grades to us, and the hospital making certain discriminations in favor of acute cases. The diagnoses, however, are sufficiently varied and show that fever has occurred in imbecility, epilepsy, arteriosclerotic dementia, general paralysis, dementia praecox and manic depressive psychoses. Of 19 cases of manic depressive insanity, 13 had fever and six did not. Of 19 cases of dementia praecox eight had fever and 11 did not, this being the only disease in which normal temperatures were found more often than the reverse.

This paper is an examination of the temperature charts found in these consecutive cases, singly and in groups. We have first a group of several initial fevers of from two to three degrees, subsiding to normal in from

one to eight days. This group is shown in composite on Chart 1. We can see that such initial temperatures have little meaning for the mental disease. A drop to normal coincides with the coming of the patient under control, after the family, with insufficient advice and help, has allowed the patient to become constipated, or superficially infected from dirty teeth, nails or skin. Noticing the fever, however, is of value in emphasizing the need of immediate treatment; while such conditions undoubtedly mean little if treated they may mean much if neglected.

It has been our custom after getting the temperature to the normal line for a few days to discontinue the chart to the time when clinical indications arise for renewing it. In certain cases, however, we have picked up fevers by taking records without such clinical indications. Such a record as Chart 2 shows what happens sometimes and suggests that the routine use of the thermometer should continue at least through the first menstrual period. The use of the full monthly page of the average temperature chart, even with continued normal findings, seems justified as a routine measure.

A group of three long continued temperatures in general paralysis cases is shown in Chart 3.

Illustrations of fever in all sorts and conditions of defect and disease are supplied freely in the remaining cases; in an imbecile, for instance, at the menstrual period, and in five cases of gross cerebral damage (Chart 4).

I turn now to a group of seven cases, the first of which is undoubtedly to be classified as an infective psychosis, and the last as a true manic state. It is the sequence of these cases that I wish to emphasize, with special reference to the physical factors at the onset and the gradual changes in intensity and number of certain, often recurring, symptoms.

A short account of each of these cases is needed and will be found below, while the fever line is given in Chart 5 A and B with the appropriate number. The following characteristics for the whole group may be mentioned: This was the first attack for all cases, except the last; the ages at onset ranged from 26 to 49; the Wassermann reaction was negative for all seven cases, although the fourth case had syphilis three years ago, followed by thorough treatment; none of the cases used alcohol.

CASE 1. First attack at 33. Measles at 30, with gradual loss of weight since. For a month indefinite symptoms of pelvic inflammation. While in a general hospital, where she was sent in order to have a diagnosis made between a local inflammatory process and typhoid fever, she suddenly became desperate, tried to throw herself out of the window, had vague delusions of persecution. On admission disoriented, hallucinated, apprehensive, incessant, incoherent talk. Tube fed. Catheterized. In the second month pustules on the legs. Recovery in eight weeks. (Nine weeks total illness.)

CASE 2. First attack at 32. Miscarriage five months ago. Purulent vaginitis on admission. At home, in a period of seven weeks, short depression followed by short excitement and then confusion. On admission disoriented, apprehensive, continual incoherent talk. Tube fed. Catheterized. In the second month a boil on the buttocks. Recovery in seven weeks. (Four months.)

CASE 3. First attack at 49. For past three years gradual increasing fatigue, headache and backache. Pus and albumin in the urine on admission. Three weeks ago made remarks that could not be understood. Two weeks ago still in general hospital. She became grandiose, hallucinated, talked incessantly. On admission partly oriented, exhilarated, distractible, with spasmodic intermittent motor activity. On recovery, it was shown that she had no memory for the first ten days at the hospital. Recovery in three weeks. (Five weeks.)

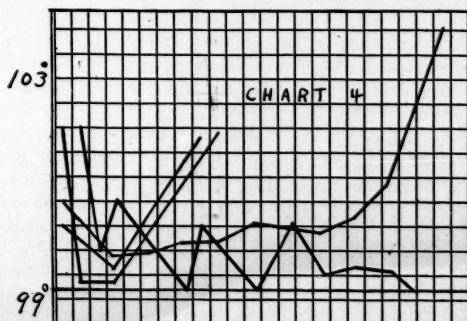
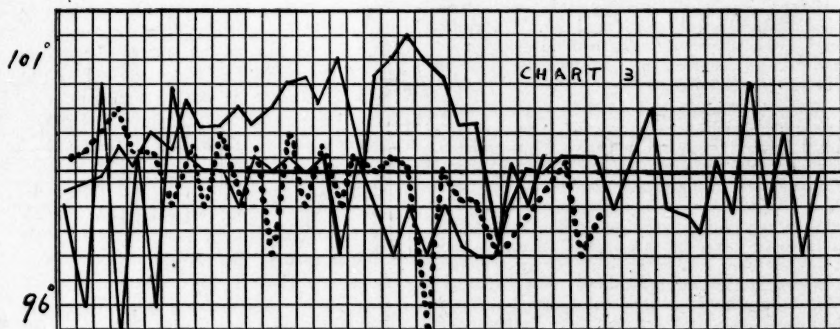
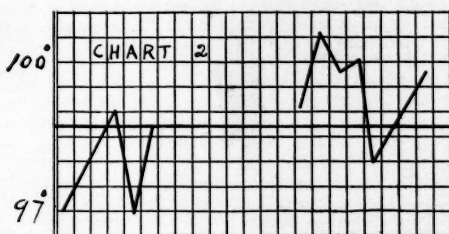
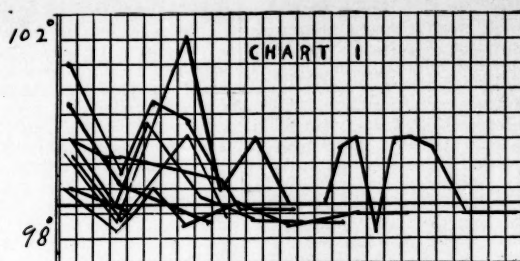
CASE 4. First attack at 26. Syphilis three years ago with unusually conscientious treatment, resulting in six negative Wassermanns. Three weeks ago abortion, followed by operation at general hospital. Two weeks ago restless, began to see devils and ghosts. Two days ago salvarsan intravenously. One day before admission given salvarsanized serum by lumbar puncture. On admission slightly oriented, incessant talk, and continuous motor activity. Emotional state in general exhilarated, but very labile. Flighty and destructible. Rather fixed by unsystematized delusions of poison. Fragmentary insight. Tube fed. No change after one year.

CASE 5. First attack at 35. Two weeks ago "grippe." Yesterday temperature 104°. Signs of a valvular heart disease on admission. For four months a mild depression. For a week delusions of poisoning, hallucinations, alternating depression and hilarity. On admission disoriented, flighty, distractible, rhyming; extreme activity. Mood chiefly exhilarated, labile. After a month semi-stuporous, temporary paralysis on the left side, blisters on finger ends. After two months, condition about as on admission. Tube fed. Catheterized. Papular eruption second week. Recovery in a year.

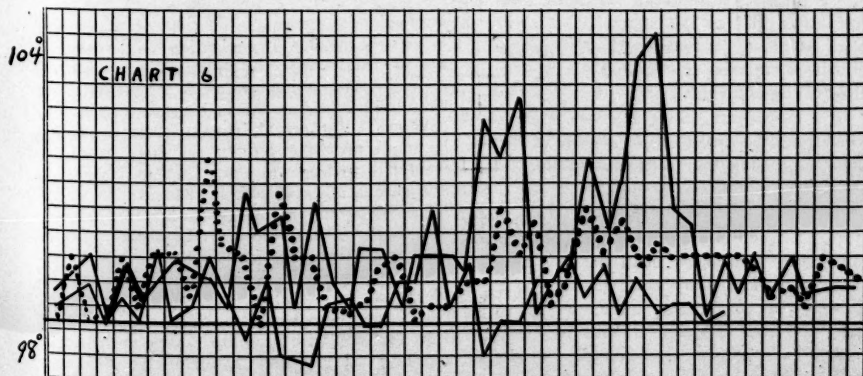
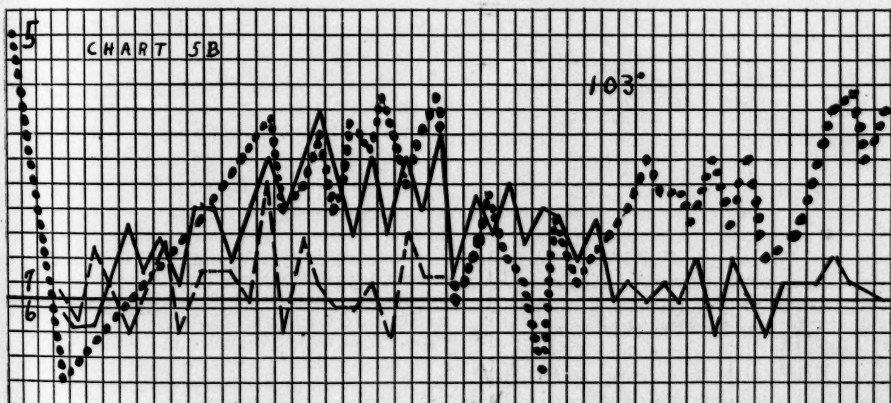
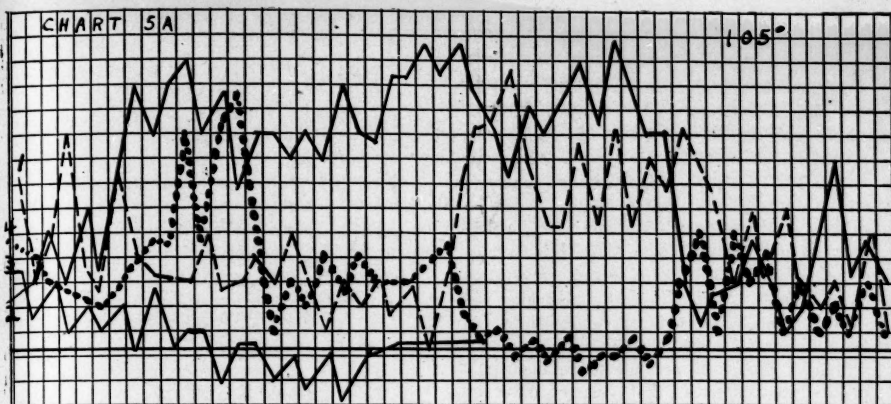
CASE 6. First attack at 26. For eleven days fever, headache and backache, abdominal distress, "grippe." On admission small boil, albuminuria. For six months sensitive and worried. Seven days ago talkative, dazed, incoherent. On admission little or no orientation, flighty, distractible, incoherent at times. Extreme psychomotor activity. Mood unusually happy, playful; except on the eighth day during a sudden attack of apprehension. For several months quieting in motor activity but still flighty, distractible and showing contagious exhilaration. During most of the first two months she had furunculosis. Recovery in nine months. (Ten months.)

CASE 7. Attack of manic depressive depression at 32. Second attack at 49. Menopause began six months ago. (Chills, sweats, head and backaches, falling sensations in abdomen.) December 18-25 confined to bed by grippe." December 26, laughing and screaming spells, talkative, flighty, exhilarated. On admission, psychomotor activity. Orientation little or none. On the second and fifth day hallucinations interrupted by short depressed periods in which the patient showed apprehension, self-accusation, was suicidal. The day after this second attack she said, "When I woke up I was as happy as a lark." At times later she was screaming, incoherent, threatening. Recovery in eight months. (Ten months.)

What is the best way to regard the gradualness of the transitions from one end of this scale to the other? Kraepelin<sup>1</sup> would refer us back to his concept of the manic depressive process as a whole. According to his point of view, we should say of our Case 7 in her second attack: If she had an attack of manic depressive insanity once, she has it again regardless of infection, fever or anything else." He goes much further than this in citing a case in the latest revision of his textbook: "I recall one patient who immediately after childbirth came down with what looked like a collapse delirium and quickly recovered, then after many years showed the picture of amnesia and a thrombosis. There was a gradual transition from this state to an unmistakable manic excitement, in which she died. I have no doubt now that both of these attacks were manias." Secondly, Kraepelin would have us consider the purity of the clinical picture; in Case 7 the frankness of the exhilaration (here emphasized by depressive intervals), the lack of bewilderment, of hallucinations, etc. He does not dodge the issue: Case 6 is either manic depressive or it is not: the essential differential symptoms may now be covered up, but later







close clinical study will enable us to come back and take this case into the manic depressive group, or reject it.

Bonhoeffer<sup>2</sup> regards these transitions between our cases from a different viewpoint. According to him we may call Case 7 an endogenous mania, and at least Cases 5 and 6 as exogenous manias. He doesn't mind giving the term "true mania" to a disease picture which he believes has developed from an infection. It seems to him that this manic reaction is nothing else than a specific effect of certain toxic-infective materials. While Kraepelin is looking for variations in different infective toxins to explain different mental states (in which manic depressive conditions are not to be included) Bonhoeffer conceives that many differing toxins from different infective agents, will produce in a predisposed individual the same reaction, which may well be a manic depressive one.

In the consideration of these cases we are helped by adding a suppositious Case 8, a typical mania without infection and without delusions worthy of the name. The question then becomes—what is the relation of the central cases to this Case 8?

Cases 4, 5, and 6 have as their chief feature toxins whose origin (bacteria) are in a general way known—toxins which are producing on one side certain measurable physical changes in the body, and on the other side flight, distractibility, psychomotor activity and more or less exhilaration. Something in Case 8 is also producing the latter group of symptoms, but without physical changes which are measurable by our present day methods. The fact of personal predisposition underlies the infection as well as the mania. The series of cases points to a consideration of manic depressive symptoms as liberated directly, or indirectly, by a toxin.

In a last chart (6) are shown some cases which could be used to build a series of depressions paralleling the excitement group.

#### IN CONCLUSION.

All of these temperature records were made for women entering a small hospital between January 1 and July 7. One-half of them showed some fever, and fever was shown in many different diseases. Fever is now regarded as a conservative process: its defini-

tion is "the process of adaptation to such toxic agencies as can be neutralized by development of antibodies;" its producer is a protein in the blood. In a few of them we have the toxemia of severe infection producing or setting free symptom-complexes which remind us of manic depressive insanity.

In those cases where fever and psychosis seem independent a certain unity comes with the view that the body is engaged in two defense reactions at the same time.

#### REFERENCES.

- <sup>1</sup> Kraepelin: *Psychiatrie*, 8th Ed., Vol. II, Chapt. IV.
- <sup>2</sup> Bonhoeffer: *Die Psychosen*, 1912, Hb. d. F., Sp. 1, III, 1, 109.

### Book Review.

*The Modern Treatment of Mental and Nervous Disorders.* By BERNARD HART, M.D. New York: Longmans, Green & Company. 1918.

The problems presented to the profession by mental and nervous disorders have been attacked throughout medical history from different points of view. This volume, *The Modern Treatment of Mental and Nervous Disorders*, presents the two main schools of thought which have arisen in regard to the causation and treatment of these conditions. One group maintains that physiological disorders in the brain or other organs are responsible for mental and nervous disturbances; the psychological theory, on the other hand, attributes them to mental causes. This volume expresses the belief that in every case both physiological and psychological factors are present in the chain of causation. In cases where the former predominate, physiological methods of treatment should be emphasized; where psychological factors are predominant, treatment must be of a psychological character. Investigation and research are needed in order to determine more accurately the relative importance of these two types. This book considers the facilities available for treatment; for actual insanity there seems to be ample provision, but for the early stages of mental disturbance and for nervous disorders, adequate means are lacking. The war has made it necessary to provide treatment for numerous cases of "shell shock"; the author of this book asks that it be remembered that these cases are essentially the same as many nervous disorders in civil life, and that the methods which have been used with success during the war, together with organized investigation and teaching, will be made available for civilians.

## THE BOSTON Medical and Surgical Journal

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### DIETARY EXPERIMENTS IN PRODUCING PELLAGRA.

In an attempt to determine whether or not pellagra is a disease caused by dietary deficiency, investigations have been made in this country, and also in Egypt. A comparison of the evidence yielded by these two experiments is of considerable interest, particularly as in the experiment conducted in this country a deliberate attempt was made to produce the disease in subjects who volunteered for the purpose, while in Egypt pellagra broke out as a natural consequence of a condition favorable to the development of the disease.

The experiment undertaken in this country at the Rankin Farm of the Mississippi State Penitentiary is recorded in Bulletin 120 of the Hygienic Laboratory of the Public Health Service. In 1915 twelve white convicts volunteered for the experiment, to test the possibility of producing pellagra in previously healthy men by means of a one-sided monotonous diet composed

chiefly of cereal products, which previous studies have given reason to believe is associated with a high pellagra incidence. The men were segregated and placed under special guard, and eleven remained throughout the experiment. There is no history of any previous occurrence of pellagra on this farm, and no direct communication with the outside world was allowed the men under experimental observation. The sanitary conditions were good, and no work involving more than a moderate light muscular exertion was required of the volunteers. From February 4 to April 19, the men were kept under observation without any change being made in the regular prison fare, thereby allowing opportunity for observing any evidence of existing pellagra had there been any. The second period extended from April 19 to October 31; during this time the volunteers were subjected to an experimental diet in which the principal ingredients were highly milled wheat flour, maize meal and grits, cornstarch, white rice, cane sugar, sweet potatoes, pork fat, cabbage, collards, turnips, turnip greens, coffee, Royal baking powder, salt, and pepper. During the first three months some buttermilk was used in the making of wheat biscuits. This study suggests that in the production of pellagra, the dietary factors to be considered as possibly essential are: (1) an amin acid deficiency; (2) a deficient or faulty constitution of the mineral supply, possibly, but doubtfully; (3) a deficiency in the fat soluble vitamine intake, and perhaps (4) an as yet unknown (vitamine ?) factor. It still remains to be determined what combination of these factors constitutes the specific pellagra-producing dietary defect or defects. As pellagra developed in at least six of the eleven volunteers during the time in which they were observed, the investigators feel justified in concluding that diet is at least the primary controlling etiologic factor in the development of pellagra.

To a similar conclusion point the results of the investigations carried on at Port Said, Egypt, where a group of Armenian refugees landed after being driven from their homes near Antioch because of Turkish oppression. The group of four thousand survivors, four hundred of them children and five hundred others between four and fourteen years, had been subjected to privations of all sorts before reaching the camp at Port Said. After a period of about six months, a disorder recognized after-

wards as pellagrous, broke out, affecting about five hundred of the campers. The report of the investigation, undertaken by Dr. White, deputy director of the public health laboratories of Cairo, states that there was apparently no special distribution of the disease in relation to the different parts of the camp. The workmen, chiefly farmers employed from outside the camp, were obliged to live on the camp diet, having comparatively little money with which to supplement their diet. Other conditions were not favorable to the development of the disease; the water supply was above suspicion, the disposal of excreta was managed in a sanitary way, and there was no reason to believe insect carriers had a part in the outbreak. An improvement in the dietary, however, with no further development of the disease thereafter, seems to leave no doubt in this case, as in the case of the experiments conducted at Rankin Farm, of the significance of dietary deficiency in the development of pellagra.

#### MEDICAL NOTES.

**U. S. PUBLIC HEALTH SERVICE HOSPITAL FOR "SHELL-SHOCKED" SOLDIERS**—The new government hospital where the U. S. Public Health Service will provide special care and treatment for "shell-shocked" soldiers was opened at Perryville, Maryland, on September 24, with the transfer of over 100 patients from the temporary hospital at Cape May, N. J. The new institution is in charge of Dr. E. H. Mullan, an experienced regular officer of the Public Health Service, who has been the commanding officer at Cape May.

The Government reservation at Perryville offers exceptional opportunities for special care and treatment of the mild types of mental disorders included in the term "shell shock"; for in addition to the main hospital building, there are numerous individual cottages where special care and a home-like environment can be provided when it is necessary for the promotion of the patient's recovery.

At the present time the Public Health Service has under treatment over twelve thousand discharged soldiers suffering from "shell shock" and other mental disorders. Of these, 5578 are in hospitals operated by the Service, the others are in other hospitals where proper care and treatment are provided under contract.

Reports received from the Government tuberculosis sanatoria of the United States Public Health Service demonstrate the great value of occupational therapy as an adjunct in the treatment of discharged and disabled soldiers. Occupational therapy as carried out by the reconstruction aides of the United States Public Health Service, consists chiefly of mental work and manual handicraft designed for curative and diversional purposes. Physicians in charge of tuberculosis sanatoria often have been discouraged by the failure of a large proportion of their patients to remain under treatment a sufficiently long period. Many of the patients, disregarding the advice of their physicians, leave within a month of their admission. The Government report states that out of 392 patients admitted to one sanatorium, 263 took occupational therapy and 129 did not. Of the former only two patients left the hospital against the advice of physicians in charge. On the other hand, of the 129 who did not take occupational therapy, 83 either deserted or left the hospital against the advice of the physicians in charge. This is less than 1% among the former, as against 65% among the latter class of patients.

Occupational therapy is one of the latest developments in the modern care of patients. It is applicable to all kinds of conditions, both for direct, curative action, for the improvement of function of muscles and joints, and for the purpose of stabilizing the patient by increasing his morale. The results obtained by the United States Public Health Service have been excellent. Occupational therapy is not vocational training. In the hospitals conducted by the U. S. Public Health Service occupational therapy is given to bed patients and to convalescent patients. Not until the patient has recovered is this form of therapy succeeded by vocational training. The Public Health Service operates the largest unit now engaged in occupational therapy and physiotherapy, and employs over 300 expert aides, the greater part of whom are women.

#### BOSTON AND MASSACHUSETTS.

**WEEK'S DEATH RATE IN BOSTON.**—During the week ending October 16, 1920, the number of deaths reported was 184 against 203 last year, with a rate of 12.83 against 13.29 last year. There were 37 deaths under one year of age against 39 last year.



The number of cases of principal reportable diseases were: Diphtheria, 40; scarlet fever, 31; measles, 7; whooping cough, 20; typhoid fever, 2; tuberculosis, 35.

Included in the above were the following cases of non-residents: Diphtheria, 10; scarlet fever, 3; whooping cough, 1; tuberculosis, 5.

Total deaths from these diseases were: Diphtheria, 5; whooping cough, 2; typhoid fever, 1; tuberculosis, 8.

Included in the above were the following cases of non-residents: Diphtheria, 2; tuberculosis, 1.

Infantile paralysis cases, 11; deaths, 3.

**INFANTILE PARALYSIS IN BOSTON AND MASSACHUSETTS.**—Reports made to the Massachusetts State Department of Health of new cases of infantile paralysis for the forty-eight hours ending September 27 included thirteen cases, reported from the following towns: Reading, two; and one each from Boston, Beverly, Malden, Brookline, Quincy, Cambridge, Weymouth, Methuen, Marblehead, Natick and Newton. For the week ending September 25, the total new cases were sixty-eight against sixty-six for the previous week; fifty-three for the week before that and fifty-two for one week prior to that. On September 28, twenty-five new cases were reported for the preceding twenty-four hours. Of these cases seven were reported from Boston, three from Haverhill, two each from Brockton and Waltham, and one from Lowell, Beverly, Holliston, Malden, Somerville, Winthrop, Medford, Lexington, Manchester and Framingham. The epidemic reached its height in 1916 during the week of September 23, with a total number of 186 cases. The highest weekly figure reached this year has been 68, during the week ending September 25.

**CLINICAL AND SURGICAL ASSOCIATION OF MASSACHUSETTS.**—At a meeting held recently in Worcester there was organized the Clinical and Surgical Association of Massachusetts. The objects of the Association and methods for work in the future were clearly defined. It was felt that the organization should be democratic, and that no surgeons upon whom major surgical responsibilities must of necessity fall should be excluded, provided they measure up to the legal requirements of the state in which they reside and have had adequate education and have observed ethical standards. The following officers

of the Association were elected: George H. Gray, M.D., F.A.C.S., Lynn, president; C. A. Bonney, M.D., New Bedford, and C. B. Gay, M.D., Fitchburg, vice-presidents; S. Chase Tucker, M.D., Peabody, secretary; and M. A. Tighe, M.D., Lowell, treasurer.

The Association has announced that in future it will undertake to provide:

1st. An annual surgical congress in Boston—the first one to be held November 10th and 11th, 1920, at which the clinics will be given at the leading hospitals by leaders of the profession,—which will be comprehensive and democratic.

2nd. General meetings at which addresses on subjects of special interest will be given by someone who is recognized as an authority in his line.

The necessary business of the Association will be transacted at these meetings.

Ample provision for the entertainment of the members, their families and guests.

3rd. The Association will provide opportunity for full discussion of all matters concerning the profession and material interests of its members, and the public, and institute such means for their accomplishment as seems best to the majority.

Under material interests the matter of Legislation would seem to be of special importance, and a special committee is projected whose business shall be to watch and report upon matters of that kind with recommendation for action.

The Charter of this Association is open till the close of the November Congress, in order that all who believe in its purposes and are honestly trying to help, and looking forward to a fuller coöperation, may join.

A welcome is extended to all surgeons eligible to membership in our Association, and it is necessary that prompt application be made to insure adequate accommodations for the November Congress.

Program of Events will be forwarded at a later date to all who express an interest or desire to unite themselves with this organization.

#### NEW ENGLAND NOTES.

**FRENCH ORPHANAGE FUND.**—The New England branch of the French Orphanage Fund has reported contributions to the amount of \$618,987.86.

### Miscellany.

#### ABSTRACT OF REPORT ON EYE INJURIES.

By FRANCIS D. DONOGHUE, M.D., BOSTON,  
Medical Adviser, Massachusetts Industrial Accident Board.

THE purpose of the medical committee in preparing this report should be not to go back of existing laws or to concern themselves with the reasons underlying specific compensation payments. A principle honored by general acceptance must serve the purpose of practicability. It may be considered unwise, therefore, to suggest radical changes, but rather to concern ourselves with simplifying by broad interpretation the administrative problems.

It is our purpose to call attention to statutory defects concerning the conditions under which specific compensation is to be granted following ocular injury. In some acts it is laid down that specific compensation is to be granted when vision is reduced to one-tenth of normal with glasses. But what constitutes normal, and how is a board of laymen to determine intricate points in higher physics when statutory language is either defective, ambiguous, or non-specific? To correct this situation, let us lay down two theses:

1. Normal central visual acuity is not normal vision.

2. One-tenth of normal vision does not mean one-tenth of normal central visual acuity alone.

Attempts to reduce complex human mechanism to formulas are very old. Nowhere has this tendency been more pronounced than in the attempt to formularize visual economies. And both effort and object are alike laudable were it not for the fact that we are dealing not in terms of constants nor of approximate constants but with a multiplicity of variables admitting of such broad limits of interpretation that in each instance the variable becomes a subject of expert discussion. Thus when the number of such variable factors approach 15 to 20 to the completed formula with the end design of estimating visual diminution in percentage, together with its value to the particular individual, of what practical value is such a completed formula if each component term is again to be made the object matter of expert controversy and time loss?

The human machine is not the sum of its parts; a man is not the sum of his functions. He is the sum of his functions plus an individuality. This individuality—it is bromidic to say it—is the difference between success and failure, between artistic achievement and barren years of effort, between efficient economic output and discouragement.

To particularize: for 35 years attempts have been made to so estimate visual diminution or loss in terms of central and peripheral visual

acuity—in percentage, in terms of age, occupation, social status, general health, education, physical type—residual condition of opposite impaired or unimpaired eye, and many other more or less factors with the idea of rule of thumb adjustment in visual loss from injury or disease. As in so many other avenues of human activity, such data can be computed only as integers and measured in their entirety by the life trained individual who can properly separate the essential from the non-essential and winnow grain from the chaff.

Formula construction applied to the human eye and its functions has been done 25 years since, and thoroughly done, admitting of but little improvement. If you concede the value of a formula having for its aim estimation of economic visual loss in percentage it is ready at hand and has been so for a quarter of a century and appeared in *Visual Economics*, by Magnus and Wurdemann, 1902. More recently we have had the efforts of the Chicago Ophthalmological Society reported by Dr. Frank Allport in the *Monthly Labor Review* of the United States Bureau of Labor Statistics of April, 1920.

The need is not so much for a measure of central visual acuity under this table or that (and Snellen serves perfectly well without embellishment) as a measure of practicable vision. No attempt to modify any present standard of central visual acuity meets this requirement, and so many are the factors to be taken into consideration in the individual case, some of which, naming only a few, are intensity of the light sense, size and character of the visual field, industrial requirement of the individual case, previous training, doctrine of master eye associated with right or left handedness, and muscular errors, that any attempt to create an arbitrary table which would adequately evaluate these factors is a practical impossibility.

It is, therefore, evident that those men involved with the practical administration of the law involving complex formulas and scientific facts must choose a practical and working ground between tables and charts or the other extreme of mathematical formulas, impracticable by reason of their complexity even if correct in the scientific sense.

In administering present laws and in striving for changes, such laws as have the wording "to one-tenth of normal vision with glasses," are unjust and cannot be too quickly discarded. Three-tenths should be a minimum, and specific compensation should be granted when vision is reduced to three-tenths of normal central visual acuity if no concurrent field or muscular defect exists.

Specific compensation for the loss of vision should be within the discretion of industrial-accident boards, who in granting such compensation should have in mind the occupational visual requirements, previous training of the injured employee, and the fact that one eye

was better than the other before the injury. When central visual acuity of five-tenths of normal with glasses exists, specific compensation should not be granted unless a considerable defect of the visual field exists whereby the resulting vision is impracticable.

Industrial-accident boards should take into account not only central visual acuity but consider central or peripheral field defects of permanent or annoying conditions, such as dazzle, blend, or diffusion circle. Arbitrary construction of present laws may work an injustice in a very large portion of cases.

To adjudge such cases, the rationale must be:

1. Is binocular vision necessary for the occupation?
2. Does the employee have binocular vision?
3. Is the resultant vision of the injured eye such as to produce useful or non-useful binocular vision?

It then follows that for an equitable award in the given case, at least the following procedure must be carried out:

1. The exact vision of either eye must be established.
2. The master eye must be determined.
3. The visual needs of the particular occupation must be considered (not difficult).
4. A decision should be rendered, after hearing testimony on those three points, as to whether the vision in the injured eye is so low as to preclude useful binocular vision in the individual's occupation.

In board practice this would readily work itself out (which amounts to a paraphrase of the foregoing)—

1. Categorizing occupations in terms of their visual requirements.
2. Obtaining visual data of injured and other eye by impartial examinations, together with a statement as to binocular vision and master eye.
3. Determining by conference, hearing, or even by impartial report alone (as is possible in all but very few of these cases) whether the resultant vision in the injured eye is so efficient in producing binocular vision that the binocular vision thus obtained will enable the employee to carry on his occupation as before.

The boards may well consider the establishment of standard methods of examinations, and as the law at present reads "to one-tenth of normal vision," the committee considers standardization upon that basis, although the same standards apply if the minimum vision were stated as two-tenths or three-tenths, and as many laws read "with glasses," that also is considered.

- a. A definition of normal vision expressed in terms of ability to correctly interpret form at infinity.
- b. Test object and illumination.
- c. Examination methods.

d. What is considered one-tenth of normal vision.

e. A word as to the practicability of that part of the law which reads "with glasses."

a. By normal vision is meant the ability to correctly interpret at infinity symbols that are constructed according to definite mathematical formulas, in that the letter or ideograph as a whole must subtend an arc whose visual angle is five minutes and the component parts of the letter a visual angle of one minute measured from the top and bottom of the letter to the nodal point of the eye. The symbols used may be letters in English (Roman), Hebrew, Russian, Greek, or any other form of letters or hieroglyphics or ideographs provided only the arc subtended be five minutes and the parts one minute.

b. The letters or symbols should be illuminated more diffusely than focally from any steady source and within rather broad limits, say of from 2.5 to 5 foot candles when artificially illuminated (and for purpose of uniformity artificial illumination is always best), but in no case to be so overilluminated that glare and cross lights result. The illuminating source should be screened from the examined. The symbols should, except in the instance of measuring the light sense, as in glaucoma or optic atrophy, show marked contrast to the background. Some have personal preference for India ink or lampblack etched into white porcelain and as second choice black printed letters on a white card.

c. The examined is placed at infinity (the distance at which accommodation and convergence no longer act, roughly 21 feet) and is instructed to read—each in language of preference—and in the case of illiterates to tell the content of an ideographic card. Having ascertained the visual acuity of either and both eyes at infinity, the individual is moved to different distances and again told to read to the extent of his ability. This properly done is a time-consuming maneuver but has the desirable quality of exactness in that a half dozen or a dozen distances may be tried and the result fraction or percentage must always be the same. Such procedure is the only way that exact vision may be obtained and proved, and must accord with the corroborative results of skiascopy, keratometry and examination of the fundi. These last three should always be done, and a record of vision without these records, while not valueless, is inexact. With them in experienced hands there can be no cavil as to visual results, either in those cases which are either just above or just below the arbitrary one-tenth of normal standard the law sets. Such method contrasts violently with the rule of thumb adopted in quick examinations of placing the patient 20 feet from the card and asking him if he can "see the big E." The necessity of using skiascopy, keratometry, and fun-

dus examinations is shown if the law expressly states vision with corrective glasses, and corrective glasses are properly not a matter of subjective choice as an individual part, but are a carefully worked out formula obtained objectively by these methods before being put upon the patient for correction. To sum up, either eye is tested separately at varying distances for the purpose of proof and checking, and further checked by objective methods.

d. That eye should be considered below one-tenth of normal which with correction fails to read test symbols designated for ten times the distance of the patient from the symbol, repeating the test at varying distances and checking for uniformity of results and finally showing a consistence with objective tests.

c. A word as to glasses. In just the same way that a thick biconvex lens of 12 diopters over an eye operated for cataract can not be worn for practical purposes when a good opposite eye is present, and consequently for purpose of the law such an eye is to be considered as lost or valueless, just so impracticable is the correction of the irregular astigmatism caused by corneal cut (and a very large percentage of industrial eye injury results in corneal scarring from cut, burn, or traumatic ulcer), since the glass which corrects must needs be adjusted to such a degree of nicety as regards axis that in event of opposite sound eye, the glass which corrects the injured eye is generally of no value to a laborer or an artisan, and oftentimes is not tolerated even when urged. In this respect the law "with glasses" should be as broadly interpreted as in the instance of the cataract glass. In the working out of such a revised law a proper report of ocular examinations should contain a statement, not merely of the central visual acuity, but also a statement of field measurement of the light sense, refraction, and adaptation index of the particular eye to the individual's occupation both before and after injury (if possible).

To summarize, a standard eye examination would be about as follows:

1. A visual test—with vision expressed for either eye, according to Snellen or Monoyer, both in the refracted or unrefracted states under a diffused light of not less than 2-foot candles and not so great as to produce glare. This gives wide range.
2. The nature of the refraction.
3. A statement as to the fundus and refractive media.
4. The retinoscopic data of either eye.
5. The ophthalmometric data of either eye.
6. The visual fields—in important cases reduced to diagrams in degrees—giving peripheral limitations, central, paracentral and peripheral scotomata.
7. Data of external eye.
8. The muscular balance.
9. Date of adnexa.

#### RECENT DEATH.

DR. HARRY EDWARD SEARS of Beverly, Mass., died October 20, 1920, in his office at 25 Broadway.

Dr. Sears was born April 11, 1870, the son of Edward S. and Isabelle (Wagner) Sears, and was a descendant of Richard Sears of the Plymouth Colony of 1633. He was educated at Boston Latin School and at Harvard, where he received the degree of A.B. in 1893; and at Harvard Medical School, from which he was graduated in 1896. For more than 20 years he had been a practising physician and surgeon in Beverly, during which time he had been visiting surgeon to Beverly Hospital. He joined the Massachusetts Medical Society in 1897 and had been a counselor from the Essex South District. At the time of his death he was associate medical examiner for the seventh Essex District.

When the United States entered the World War Dr. Sears at once interested himself in the formation of Field Hospital Unit No. 30, which went to France from Fort Ethan Allen, Vermont. Before going, however, he helped to organize two similar units.

Upon his arrival in France he was assigned to the 5th Sanitary Division and later was transferred to Evacuation Hospital No. 1, and still later to No. 37. He received his discharge from the Army in May, 1919.

Dr. Sears' service as a member of the Medical Corps of the American Expeditionary Forces in France was such that he was promoted to the rank of lieutenant-colonel. He was one of the recognized expert pistol shots in the country and represented the United States at the Olympic meet at Stockholm in 1908.

Dr. Sears was married in 1902 to Miss Myrtle Walker of Beverly who, with two sons, survives him. He was a Mason and a member of various medical fraternities and social clubs.

#### SOCIETY NOTICE.

CLINICAL AND SURGICAL ASSOCIATION OF MASSACHUSETTS.—The first meeting of the Clinical and Surgical Association of Massachusetts will be held at the Boston City Club on November 9, 10, and 11. At the first annual dinner on November 9, addresses will be made by the President, Dr. George H. Gray, F.A.C.S., and by Dr. John B. Deaver, F.A.C.S., Philadelphia. On November 10 clinics will be held at the principal hospitals in the city during the day; in the evening there will be a general meeting at which remarks will be made by Dr. F. J. Cotton, F.A.C.S., Chairman of the State Branch of the American College of Surgeons, and an illustrated address on "Osteoplastic Surgery" will be given by Dr. F. H. Albee, F.A.C.S., New York. Clinics will be held on November 11.

All surgeons connected with regularly established hospitals in Massachusetts and adjoining states are urged to attend this first clinical meeting to familiarize themselves with the purposes and working plans of the Association. The officers of the Association are: Dr. George H. Gray, F.A.C.S., Lynn, President; Dr. C. A. Bonney, New Bedford, and Dr. C. B. Gay, Fitchburg, Vice-Presidents; Dr. S. Chase Tucker, Peabody, Secretary; and Dr. M. A. Tighe, Lowell, Treasurer.

SUFFOLK DISTRICT MEDICAL SOCIETY.—The Censors of the Suffolk District Medical Society will meet for the examination of candidates at the Medical Library, 8 The Fenway, Thursday, November 4, 1920, at four o'clock.

Candidates should make personal application to the Secretary and present their medical diploma at least one week before the examination.

RICHARD H. MILLER, Secretary.  
402 Marlborough Street, Boston.